

Generation of broadband plasma waves in the polar cap boundary layer

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Broadband plasma waves in the frequency range of $<10^1$ to about 10^4 Hz have been observed in the polar cap boundary layer (PCBL) by POLAR. These waves have similar intensities and the power law spectra as the broadband waves in the low latitude boundary layer (LLBL). A linear theory for the generation of these waves is presented. The analysis takes into account various free energy sources such as field-aligned currents, and gradients in the currents, magnetic fields and plasma densities. Our analysis generalizes the dispersion relations for the lower-hybrid and current convective instabilities, and in addition takes into account the electromagnetic effects in a self-consistent manner,

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